Number 79, July 1996

Tomorrow's Air Force

by Martin C. Libicki and Richard Szafranski

Conclusions

- The U.S. Air Force stands at a crossroads as it contemplates its long term future.

- It can retain its atmospheric orientation and find itself mired in endless and fruitless debates over which military tasks (e.g., anti-tactical missiles) best fit which medium--and thus service.

- Yet, aerospace is no longer the high ground of combat--the medium whose domination makes victory everywhere else a matter of effort rather than fortune. Information plays that role today.

- As the world's leading military service in the application of emerging technology, the Air Force will be best served by adopting an infospheric orientation. By doing so, it can lay claim to the three new missions of the 21st century: strategic defense, global transparency, and extended information dominance.

Coming to Grips With the Future

In 1995, the leaders of the U.S. Air Force asserted long-range planning in the Air Force was "broken" and they would fix it--as they must. By now, it is hardly news that the whole Department of Defense must come to grips with two fundamental issues: the "why" and "how" of warfare.

The "why" concerns history--the domination of world politics by great power struggles--and whether they have ended, simply taken a breather, or are transforming. Today's challenges may be nettlesome but it is hard to see how the reemergence of a hostile great power would enhance the national security of the United States. In the Cold War, the Air Force prescribed bombers and ballistic missiles to help deter a "Hot War." Today's environment mandates rethinking what capabilities the United States needs if it is to dissuade potential great powers from reigniting the Cold War.

The "how" reflects the Revolution in Military Affairs. Simply put, precision munitions convert a target's visibility--its signature--into death. Just showing up risks signature. In tomorrow's battlespace everything will be far more visible than in today's--to both sides. Why? Everything--sound, light, odor, contrail vapor, pressure--leaves tracks (stealth helps--but it is expensive and incomplete). Every bit of information illuminates tracks. As bit density doubles (about every 18 months) the odds that enough of them land on something rises apace. As the World Wide Web, cheap videocameras, commercial

satellites, and unmanned aerial vehicles (UAVs) suggest, this phenomenon is not just military. Against these bits, to linger transparently is to court death. Exploiting transparency calls for topsight--the integration of bits into a coherent picture of the battlespace rather than an opportunistic sequence of isolated appearances. Ignoring transparency puts combatants, who fight while enshrouded in large metal protective boxes, at greater risk.

By history, predilection, and structure, topsight is the natural (but not automatic) domain of the Air Force. But prior to staking its claim to tomorrow's high ground, the Air Force needs to redefine itself predominantly as an *infospheric* institution rather than an *atmospheric* one. (Other alternatives for the Air Force, such as policemen for the frontiers of chaos or as information warriors, encompass valid tasks but cannot be its heart and soul. The former takes the Force from the Air Force, and the latter is too hit-and-miss to be consistent with an ethos built on strategy-to-task generation).

To understand the logic of an infospheric Air Force returns one to the organizing principles of the Service. The Air Force was formed to master a new high ground--take it, and victory elsewhere was only a matter of effort; WWI's bloody stalemate could be overleapt. Between the World Wars, the high ground was reified in manned aircraft. But technology is protean by its very nature and, *pace* Desert Storm, the information realm is becoming the new high ground. Simply put, if you can see the enemy and the enemy cannot see you, then only modest applications of precisely-aimed, correctly-timed force suffice to command the battlespace.

The Air Force and the Meta-System

The battlespace, becoming as indivisible as cyberspace, can no longer be divided into neat domains and parceled out to each Service to fight its own war--the Navy in the littoral, the Army in the fields, and the Air Force high and deep. They just keep getting in each other's way. For this reason, the future Air Force must reflect the totality of the joint armed forces.

At the heart of this joint vision is emerging a vast, interconnected, interoperable, and ultimately integrated Meta-System--a "system of systems"--to which all Services contribute and from which they all draw. The Meta-System is not the elusive silver bullet, but the convergent architecture of capabilities with which all go to war. Feeding it will be rules of engagement, commanders' intents, strategic intelligence, bitstreams from space, continuous logistics reports, status-of-forces, weather observations, sensors, operator inputs, and even the reports of global news networks. The Meta-System will supply the raw material of nearly total situational awareness, from global overlay to designated targets. If it is to do serious work, it has to be planned from the start as an integrated system (even though initially composed of legacy devices and code)--it cannot be constructed solely by gluing old systems together. In the end, someone must be in charge of building and maintaining the Meta-System for whoever is asked to command it.

The Air Force need not outfit the entire Meta-System--an organic construction of various pieces being built, tested, used, refined, reused, swapped out, and retired in their turn. What the Air Force must do, though, is envision the Meta-System's architecture and all that implies: requirements, doctrine, tests, protocols, agents, and objects. Once that is well understood, the Meta-System will grow naturally--with the Air Force vision of topsight as the ghost in the machine.

To the Meta-System support for observation and orientation must be added striking power. As for decision, the Meta-System informs but does not replace command; operators are still in charge, and the Air Force will get its fair share. As for action, an infospheric Air Force must be armed. Lest targets

disappear unscathed in tomorrow's battlespacefield, faster means of energy delivery may be needed: real-time engagement weapons ranging from lasers to neutral particle beams and high-power microwaves. Indeed, the need for fast sensor-to-shooter coupling calls for the Air Force to strengthen its command over strategic (not just nuclear) weapons, particularly those closely linked with the Meta-System itself.

Tomorrow's Missions

In addition to today's enduring missions (strategic deterrence, overseas intervention, LOC protection, and punitive strike), technology, and the need for deterrence suggest the need for three new missions: extended information dominance, global transparency, and strategic defense.

Transparency, plus a reluctance to take casualties, suggests sending large numbers overseas against lesser enemies (those who cannot possibly directly threaten the United States) need no longer be the *modus operandi* of the Armed Services. Leverage may come from empowering our allies to help defend themselves by **extending our information dominance** (particularly when aided by energized mass from over the horizon). Empowering is the key concept; telling our friends the location of enemy targets to within the blast radius of their own ordnance permits them to defend themselves against larger foes tied to ancient parameters of force. The means by which friends are so empowered are the bitstreams that feed the Meta-System, packaged for delivery rather than ingested organically.

The **global transparency mission** naturally follows. The surest deterrence to any nation aspiring to hostile great power status may be the certain knowledge that it is under continual watch. U.S. power can be "globally present" even when over the horizon. Let others so much as open factory doors in the desert, pick up the handset to summon their platform, roll a tank out of its shed onto the road, or launch an aircraft off a runway deep in the forest and somewhere, somehow, some part of the Meta-System knows--and can instantly alert whoever can best train their boresights on them. This knowledge need not always be converted into engagement; demonstration alone may deter.

As for **strategic defense,** almost everything significant about stopping a ballistic or cruise missile is finding it. To an aircraft, a missile travelling at Mach 25 is a blur; to a photon, however, it hangs in space. The same Meta-System that can arm an ally with information, and make the entire world transparent to U.S. power, can also sweep the skies for air and space threats and dispatch their real-time coordinates as needed.

These three missions favor the Air Force, not because the Army and Navy are absent--for they do play--but because they reflect basic Air Force orientation and mythos: be it high ground, topsight, or warfare as the systematic application of force for calcuable ends. The impetus follows directly from the inspiration that sent earlier generations to the flightline. Note that none of these new missions have anything to do with the human mastery of flight. That was yesterday's problem, and one thoroughly solved. It is time for the Air Force, as America's premier technological Service, to move on.

Toward a New Organizing Principle

An organizing principle lives or dies by how it informs decisions. The original theory of airpower gave the organization its mission, put the mission in the context of the other Services, suggested how the mission might be fulfilled, prioritized tasks within the mission, steered acquisition strategy (and so fostered the world's greatest aviation industry), defined the essence of being an airman, and thus contributed to the creation and sustainment of airpower.

Yet, no principle can outlive its times. Today's Air Force sees the F-22 as a must-have, the next obvious step in a logical progression of sleek machines--even in a world where everyone has given up flying against the F-15. Yet, stealth and silicon aside, the F-22 remains another souped-up, short-range, manned fighter whose costs crowd out other opportunities. Perhaps the F-22 can pass a cold-eye test even in an infospheric Air Force. But an atmospheric Air Force cannot help but buy them.

To an atmospheric Air Force, the UAV is a stepping stone to a remotely piloted combat vehicle. Yet, at several million dollars each, they must be increasingly well-protected (adding features, and hence cost). If $100,000 each, UAVs would be cheaper than the only weapon that can shoot it out of the sky. The concept of a swarm of expendable UAVs would sooner arise in an infospheric Air Force than in an atmospheric one.

In an atmospheric Air Force, space operators cannot be happy without some way of emulating their air combat cousins. Space matters, but it never had much credibility as a contested medium (even when the Soviets were around). Nevertheless, the belated discovery that our forces could be imperiled with spacecraft-derived information (e.g., permitting Saddam Hussein to see the Left Hook coming) impels space warriors to plan to shoot such craft from the heavens. Such a tasking is problematic. First, it allows others to deny the inevitability of space-mediated transparency on ill-founded presumption that we can eliminate it--all of it--when the time comes. Second, with satellites so cheap ($50 million can soon buy three-meter resolution capability), and third-party sources so ubiquitous, it will be nigh impossible to find out where bits are being picked up, how they are being sluiced from satellite to satellite, or even which portal or switch they come down to. Such thinking drives doctrine to targeting everyone else's spacecraft.

Instead of preening for pointless battle, a space command ought to recognize itself as the world's premier information component. Virtually everything it owns exists to foster battlespace awareness, connectivity, and strategic intelligence, and it would push its data as the firmament that makes sense of all other sensors' attempts to paint the battlespace.

An infospheric Air Force may also be able to play the roles and missions game more shrewdly, casting off low-information missions in favor of high-information ones, strengthening its core competence, positioning itself for vigorous institutional life well into the next century, and contributing to fostering jointness without risking its own identity.

The current division of Services by media is problematic for the Air Force. Take any given mission. Step One is to assign each Service responsibility for weapons emerging from their particular medium: ground, sea, or air. Step Two is to argue that systems emerging from one medium are of course superior to systems from another. Every service put its prestige on the line in defense of technical characteristics that play randomly across the face of combat--but the Air Force, by virtue of its need for theory rather than sentiment, inevitably puts its coherence on the line as well.

Consider close air support. The atmospheric Air Force disdains every other Service's use of aircraft in general, and so it husbands the mission but discharges it with very little enthusiasm--using the wrong aircraft, under the wrong command philosophy, and not nearly as quickly or responsively as it could, in spite of the valor of its warriors. Meanwhile, the Army makes do with never-satisfactory coordination mechanisms and then puts all the capabilities it needs in yet another platform for the mission--the helicopter--since the Air Force allows it no other choice. An infospheric Air Force would let this mission go. Close air support is a necessary but low-yield and low-information component of warfare, one which

contributes very little to topsight, and rarely to strategic effect. Armies will fight armies, and close air support will be necessary. But on which stone is it written that Air Forces must do it?

Air defense, even with long-range missiles is considered an Army bailiwick, oft-contested by the Air Force as unwarranted intrusion into the deep battle. An infospheric Air Force strategy would seek the radars and the fire-control internetting and leave the missiles to whoever wants to drag them around. True, this split is notional as long as fire control and guidance are intimately connected to specific missiles, but such coupling is precisely the wrong way to establish missile guidance. A Pave Paw's radar or an Aegis radar could guide a Patriot missile. Ultimately, it is the Meta-System which informs the firing control mechanism, and the Air Force, if it is smart, will put first claims on the Meta-System as the core of the military's information machine.

Outcomes

An atmospheric Air Force faces two possible outcomes. Splinter groups may arise, chipping off Air Force missions piecemeal and leaving the institution a withering core. Worse, the atmospheric ideology withstands all challenges--alienating its visionaries--until it wakes up to find the revolution grasped firmly abroad by those with few tears left for the Air Force.

An infospheric Air Force is a smaller leap than it seems. The Air Force has always capitalized on the speed, range, freedom of maneuver, and vantage their medium provides. Yet, nothing travels faster than information. Nothing impedes the distance knowledge can travel. Nothing makes movement more intelligent, economical, and fruitful than information. And nothing else would provide the vantage point of a Meta-System. Atmospheric solutions sufficed until technology permitted multiple solutions from any medium. The Meta-System, however, demands an integration of exoatmospheric components with those provided from air and surface. This is not a vision or role the Army, Navy, or Marine Corps are in a natural position to advance on, although they may lay claim to bits and pieces, thereby frustrating the larger aim. This is the Air Force's game to win or lose.

This paper has been prepared for the Air University's Project 2025. A longer version of this paper is scheduled for the Fall 1996 edition of Airpower Journal. Dr. Martin C. Libicki is a Senior Fellow with INSS's Center for Advanced Concepts and Technology. He can be reached at 202-685-3837 x 521, 202-685-3664 (fax), libickim@ndu.edu. Colonel Richard Szafranski (USAF) leads the Air Force's Project 2025 Team at Air University. He can be reached at 334-953-2722, 334-953-4028 (fax) or rszafranski@max1.au.af.mil. NOTE

INTERNET DOCUMENT INFORMATION FORM

A . Report Title: Tomorrow's Air Force

B. DATE Report Downloaded From the Internet: 09/27/01

C. Report's Point of Contact: (Name, Organization, Address, Office Symbol, & Ph #): National Defense University Press
Institute for National Strategic Studies
Washington, DC 20001

D. Currently Applicable Classification Level: Unclassified

E. Distribution Statement A: Approved for Public Release

F. The foregoing information was compiled and provided by:
DTIC-OCA, Initials: __VM__ Preparation Date 09/27/01

The foregoing information should exactly correspond to the Title, Report Number, and the Date on the accompanying report document. If there are mismatches, or other questions, contact the above OCA Representative for resolution.